AMENDMENTS

IN THE CLAIMS

Please cancel claims 22-26 and 28 without prejudice to the filing of a divisional application directed to the invention of these claims. Please amend claims 1 and 27 and add new claims 29-35 as shown below.

1. (Currently Amended) A method of producing a fiber from a cylindrical preform, comprising the steps of:

providing a first end of a cylindrical preform in a pressure chamber wherein the preform has a first lateral dimension along a longitudinal axis;

exposing the first end of the preform to a treatment that allows for ductility of the preform at its first end; and

applying physical pressure by flowing a focusing fluid along a portion of the preform, wherein the focusing fluid is caused to flow in a direction along the preform and toward the first end of the preform accelerating the preform by tangential sweeping forces exerted by the focusing fluid whereby the focusing fluid reduces the diameter and increases the length of the preform and forces ~~thereby forcing~~ the first end of the ductile preform ~~through an exit opening of the~~ into a pressure chamber exit opening positioned downstream of the flow of the focused fluid thereby expelling a fiber from the exit opening of the pressure chamber wherein the fiber has a decreased lateral dimension relative to the first lateral dimension of the preform.

2. (Original) The method of claim 1, wherein the treatment that allows for ductility comprises heating the preform.

3. (Original) The method of claim 2, wherein the preform is solid prior to heating and is heated to provide ductibility prior to applying physical pressure.

4. (Original) The method of claim 2, wherein the preform is heated by heating the focusing fluid.

5. (Original) The method of claim 1, wherein the preform is comprised of silica glass.

6. (Original) The method of claim 1, wherein the preform is an optical fiber preform comprised of silica.

7. (Original) The method of claim 1, wherein the cylindrical preform is a solid cylinder comprising silica glass and is expelled from the exit opening as a solid cylindrical fiber.

8. (Original) The method of claim 1, wherein the cylindrical preform is a hollow cylinder comprising silica glass and is expelled from the exit opening as a hollow cylindrical fiber.

9. (Original) The method of claim 6, wherein the focusing fluid is a gas.

10. (Original) The method of claim 9, wherein the gas is heated inert gas.

11. (Original) The method of claim 9, wherein the gas exits the exit opening of the pressure chamber at supersonic speed.

12. (Original) The method of claim 1, wherein the ductile preform is drawn through a nozzle which nozzle begins as an opening inside the pressure chamber and extends along a curved surface, ending at the exit opening of the pressure chamber.

13. (Original) The method of claim 12, wherein the curved surface of the nozzle has a surface configuration with a nozzle parameter geometry defined by an equation

$$p(x) = p_0 e^{-\lambda x}$$

where p(x) is a curve defining function which plots the nozzle geometry, p_0 is the internal pressure of the focusing fluid as it enters the nozzle, λ is greater than 0.635 to obtain supersonic speed for the focusing fluid and x is a function.

14. (Original) The method of claim 13 where λ is 2.0 or more.

15. (Original) The method of claim 13 where λ is about 5.65.

16. (Original) The method of claim 12, wherein the equation

$$P_0 \geq \frac{\mu_\ell V_1}{L}$$

applies and P_0 is the pressure at an entrance port to the pressure chamber; μ_ℓ is the viscosity of the ductile preform end, V_1 is the velocity of the fiber in the nozzle and L is the length of the nozzle.

17. (Original) A method of producing a fiber from a molten viscous liquid; comprising the steps of:

extruding a stream of a molten viscous liquid in a manner so as to flow from a supply source into a pressure chamber wherein the stream has a first circumference;

supplying a focusing fluid to the pressure chamber whereby the fluid enters through an entrance port of the pressure chamber and exits through an exit port of the pressure chamber positioned downstream of the flow of the stream of molten viscous liquid;

wherein the focusing fluid surrounds the stream of molten viscous fluid and compresses the first circumference creating a narrowed stream of a second circumference narrower than the first circumference, which narrowed stream is expelled from the exit port of the pressure chamber as a fiber.

18. (Original) The method of claim 17, wherein the molten viscous liquid is molten silica glass.

19. (Original) The method of claim 18, wherein the focusing fluid is a gas.

20. (Original) The method of claim 19, wherein the gas is a heated inert gas.

21. (Original) The method of claim 18, wherein the gas exits the exit opening of the pressure chamber at supersonic speed.

22. (Canceled)

23. (Canceled)

24. (Canceled)

25. (Canceled)

26. (Canceled)

27. (Currently Amended) A method of producing an optical fiber preform element, comprising the steps of:

providing a hollow tube having a longitudinal axis;

applying physical pressure to force the tube through a feeding source in a manner which causes the preform to be expelled from an exit opening of ~~the~~ a channel in the feeding source in a longitudinal manner; and

forcing a fluid through a pressure chamber in a manner which causes the fluid to exit the pressure chamber from an exit orifice in front of a flow path of the preform expelled from the exit opening of the channel,

wherein the fluid surrounds said preform and focuses said preform in a longitudinal manner to expel an optical fiber from said pressure chamber.

28. (Canceled)

29. (New) The method of claim 17, wherein:

the supply source is comprised of (a) a first supply tube which supplies the molten viscous liquid extruded as a stream with the first circumference and (b) a second supply tube concentrically positioned in the first supply tube which second supply tube extrude a gas; and

further wherein the fiber is a hollow fiber.

30. (New) The method of claim 29, wherein the gas is air.

31. (New) The method of claim 29, wherein the gas is an inert gas.

32. (New) The method of claim 29, wherein the molten viscous liquid is molten silica glass.

33. (New) The method of claim 29, further comprising simultaneous extrusion of multiple hollow fibers and joining the hollow fibers together before the molten liquid solidifies.

34. (New) The method of claim 33, wherein the multiple hollow fibers join together and thereafter solidify and form a photonic band gap structure.

REMARKS UNDER 37 CFR § 1.111

Formal Matters

Claims 1-21, 27, and 29-34 are pending after entry of the amendments set forth herein.

Claims 22-26 and 28 have been canceled. Claim 1 has been amended and new claims 29-34 have been added to more particularly point out and distinctly claim the invention. The amendments to claim 1 and the new claims 29-34 are fully supported within the originally filed application.

Support for the amendments to claim 1 can be found in numerous places in the specification and specifically at page 12, paragraph 54 and page 5 in paragraph 14, such as within the first sentence. This portion of the specification and others indicate that the preform is reduced in diameter and increased in length by using the focusing properties of the surrounding fluid.

New claims 29-35 are supported at several places in the specification and specifically at page 5, paragraph 15. This portion of the specification refers to the concentrically positioned tubes with the outer tube being supplied with the molten liquid such as molten glass and the inner tube being supplied with a gas such as an inert gas in order to produce a hollow fiber. The hollow fibers can be joined together prior to solidification to produce a structure comprised of multiple fused hollow fibers such as a photonic bandgap structure of the type described in the specification beginning on page 16. No new matter has been added.

Restriction Requirement

In response to the Restriction Requirement applicants have cancelled claims 22-26 and 28. Applicants have specifically reserved the right to file a divisional application directed to the invention encompassed by these claims as well as any invention disclosed and described within the present application.

35 U.S.C. §112, second paragraph rejection

Claims 1 and 27 were specifically objected to. Claim 1 was objected to as being vague with respect to the positioning of the pressure chamber and the exit orifice of the pressure chamber. Claim 1 has been amended in response to the Examiner's position. The Examiner is correct in that the flow of the fluid does continue into and through the pressure chamber as shown in Figure 1. However, the pressure chamber has an exit opening in it and the preform is reduced in diameter and forced out of the

exit opening shown in Figure 1. Thus, the exit opening of the pressure chamber is positioned downstream of the direction of the flow with the arrow in Figure 1 showing the direction of flow downstream. In view of such the rejection is believed to have been overcome.

Claim 27 was objected to as not including an antecedent basis for the term "the channel". The Examiner's objection is correct and applicant's have amended claim 27 to indicate that the channel is "a channel" which is within the feeding source. In view of such the rejection is believed to have been overcome.

35 U.S.C. §102 rejection

The first rejection is of claims 1-4 and 9 as anticipated by U.S. Patent 4,778,501 to Jeskey et al. The rejection is traversed as applied and as it might be applied to the presently pending claims.

Jeskey et al. do disclose a channel 51 through which air is forced by the convection element 50 and that air can communicate with the drawing chamber 43. However, the preform 34 is drawn in a usual manner by a drawing mechanism 64 shown in Figure 2 and explained in the specification at col. 8, lines 4-6. Nothing within Jeskey et al. suggests that the air from the convection element 50 which "reduces the diameter and increases the length of the preform" as claimed by applicants. Further, Jeskey et al. does not teach a method whereby the focusing fluid accelerates the preform by tangential sweeping forces. In view of such reconsideration and withdrawal of the rejection is respectfully requested.

Claims 1, 5-7 and 9-10 were rejected under 35 U.S.C. §102 as anticipated by U.S. Patent 4,673,427 to Van Der Giessen et al. The rejection is traversed as applied and as it might be applied to the presently pending claims.

Van Der Giessen does disclose a method for forming optical fibers. The Examiner points out that a gas is blown via the ducts 3 and 10. The gas is led into space 2 by way of the duct 3 so that the gas can escape both in the upward and the downward direction with the flanges 4 being in place so that the gas flows substantially downward. Nothing within the Figures suggest that the gas entering at this point has an effect on decreasing the diameter and increasing the length of the preform and such is not described in the patent. The gas entering at the duct 10 is led upward into the drawing furnace 6 with a downward leading current into the tube 8. Thus, the effect of the gas from the duct 10 does not appear to reduce the diameter or increase the length of the preform. In fact, the gas inlet ports 3 and 10 appear to be positioned such that the effect of each of the them may offset each other with respect to any miniscule effect they might have on the drawing process. Further, Jeskey et al. does not teach a method whereby

the focusing fluid accelerates the preform by tangential sweeping forces. Van Der Giessen et al. simply do not disclose a process which uses any type of "focusing fluid" and clearly do not use such a focusing fluid in a manner which reduces the diameter and increases the length of the preform and forces the first end of the ductile preform into the pressure chamber exit opening. Accordingly, reconsideration and withdrawal of the rejection is respectfully requested.

Within the final rejection claims 1 and 12-16 were rejected under 35 U.S.C. §102 as anticipated by U.S. Patent 5,637,130 to Nagayama et al. The rejection is traversed as applied and as it might be applied to the presently pending claims.

Nagayama et al. do disclose a gas inlet port 17a present within the upper cylindrical portion 17. An inert gas 20 also enters via an opening 22a and flows upward in a manner which is indicated so that it "serves to guide the drawn optical fiber 15." In accordance with Nagayama et al. the gas is at best indicated as being useful in guiding the drawn fiber. However, this appears to be nothing more than a conventional process. Nagayama et al. do not use a focusing fluid which reduces the diameter an increases the length of the preform. Further, Jeskey et al. does not teach a method whereby the focusing fluid accelerates the preform by tangential sweeping forces. In view of such reconsideration and withdrawal of the rejection is respectfully requested.

Conclusion

The claims withdrawn from consideration have been canceled. Claims 1 and 27 have been amended to overcome formal objections. Claim 1 has been further amended to more particularly point out and distinctly claim the invention indicating that the focusing fluid accelerates the preform by tangential sweeping forces exerted by the focusing fluid whereby the focusing fluid reduces the diameter and increases the length of the preform such is not taught within the cited references as taken alone or in combination with each other. Accordingly, the 35 U.S.C. §102 rejections are believed to have been overcome. Applicants have added additional claims in order to specifically focus coverage on the method as used for producing hollow fibers and a photonic band gap structure.

Applicant submits that all of the claims are in condition for allowance, which action is requested. If the Examiner finds that a telephone conference would expedite the prosecution of this application, please telephone the undersigned at the number provided.

The Commissioner is hereby authorized to charge any underpayment of fees associated with this communication, including any necessary fees for extensions of time, or credit any overpayment to Deposit Account No. 50-0815, order number FLOW-011.

Respectfully submitted,
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